

altogether, and only takes the east and west components into consideration. Mr. Chambers, on the other hand, while attaching considerable importance to the meridional components, except very near the Poles, omits curiously enough all reference to the probable corresponding variations in the upper currents of the atmosphere, upon which Rykatcheff discourses most effectively. Each theory alone is defective; a combination of the two would probably form a fairly satisfactory explanation of a considerable part of the diurnal variation, though it will be safer at present to conclude that, while there is a very intimate relation between the diurnal variation of the wind and the barometric tides, we do not as yet know for certain whether either is the cause of the other or whether both are not effects of some common cause.<sup>1</sup>

Mr. Blanford discusses the diurnal variation of the wind at Calcutta through the medium of Bessel's interpolation formula, and by comparing similar terms in the wind and barometric equations deduces several interesting results. Thus the single (semicircular) oscillation of the north and south components, is found to represent in all probability the diurnal land and sea breeze, while the single oscillation of the east component coincides in direction and phase with the rise and fall of the day land wind from the interior of the continent.<sup>2</sup>

Dealing in like manner with the double (quadrantal) terms, it is shown that the variations of both the north and south components and east and west components is very similar to that of the second term in the barometric fluctuation, though the course of the north and south components is exactly the reverse in direction of those at Bombay.

In part ii. of this paper the thermal, baric, and hyetic wind-roses are discussed. The results may be briefly summed up as follows:—(1) that polar currents play no part in the wind system of Bengal, which indeed might have been anticipated, owing to the presence of the Himalayan barrier to the north isolating India in so unique a manner from extra-tropical influences; (2) that rain is most probable, not when the monsoon current is blowing steadily, but "when it is deflected from its normal direction by some local irregularity of pressure," in other words, when small depressions prevail, and in this respect it would seem that the law is one of general incidence; (3) that when the periodic components are eliminated there is no definite relation between the non-periodic variations of pressure and those of temperature and humidity. This result is just what we should expect from a local application of the statistical method, now we know, thanks to the recent development of the synoptic method, that the larger oscillations of pressure which accompany the passage of cyclones and anticyclones, are due to conditions which are in operation over regions widely removed from those where such oscillations prevail. This conclusion, moreover, so far as India is concerned, derives fresh support of late from the fact that certain abnormal features in the pressure over India and adjoining countries during the droughts and famines in Madras and the North-West Provinces in 1876-77 were due to some widespread influence which mainly affected the atmosphere above the level of the Himalayan sanitaria (7000 feet), since the variations in the density of the atmospheric stratum below this level were not only opposite to those at the higher levels, but to those which prevailed in the total pressures at the lower stations throughout the Peninsula.

Paper II. "The Meteorology and Climate of Yarkand and Kashgar."—This is a discussion chiefly of the registers kept by Dr. Scully, of the Bengal Medical Service, who, in the autumn of 1874, accompanied the mission sent by the Indian Government to Kashgaria under the charge of Mr. R. B. Shaw. The observations were carefully made, and as they represent a district whose meteorology had hitherto been entirely unknown, and of which we can only get samples by the aid of such rare opportunities as political embassies, their discussion is well worth the labour which Mr. Blanford has bestowed upon it.

Where it was possible, on the route, and at Yarkand and Kashgar on four days in each month, horary observations were made.

Some evidence of the laborious nature of the task to which Dr. Scully so nobly devoted himself may be gathered from the fact that in order to get a second observer he was obliged to teach an uneducated hill coolie named Bhola, first the use of

<sup>1</sup> A full account of Mr. Chambers' theory is given in the *Philosophical Transactions*, 1873, and in the *Proc. Roy. Soc.*, xxv., p. 402.

<sup>2</sup> This wind is called an anti-convection current, as will subsequently be seen in our notice of a paper by Mr. Chambers on "The Winds of Kurrachee."

English numerals, then decimal fractions, and finally the mode of reading and recording the various instruments in the newly-acquired notation.

Any one who knows the amount of intelligence evinced by the ordinary Indian coolie, will agree with Mr. Blanford in his remark that "it was an achievement which reflected the highest credit on both teacher and pupil."

From the geographical description of the country which accompanies Dr. Scully's report, we gather that the soil is very arid, the rivers are chiefly snow-fed, and that there are deposits of *loess*, similar in all respects to that of the Rhine and the Danube. By many, this *loess* is inferred to be of subaërial origin, and the peculiar dust-haze which prevails in these regions, is cited in favour of this idea.<sup>1</sup>

The chief points noticed in this paper are: (1) the excessive dryness of the climate and consequent large amplitude of the diurnal temperature oscillation; (2) the abnormally large annual range of barometric pressure; and (3) the fact that the non-periodic oscillations of barometric pressure at Yarkand, unlike those of stations situated to the south of the Kuen-Lun, Karakoram, and Himalaya ranges, appear to have some sort of connection with those of Europe. Such large oscillations are in fact probably confined to the lower and denser portion of the atmosphere, which is effectually partitioned off from the north by ranges of such lofty elevation.

The latter part of the paper deals with the diurnal periodic oscillations in the pressure, vapour tension, and winds, and it may be observed that, in regard to the first of these, Yarkand is found to exceed in range any other place under an equally high latitude. Even in winter it averages 0°07 inches between 10 a.m. and 4 p.m., while in June and July it is 0°098 inches between the same hours.

In other respects the curve is characteristically continental, the fall of the night tide being almost evanescent.

The diurnal variation of the wind at Yarkand also presents a peculiarity worthy of remark, in that, as at Zikawei, in China, and Upsala, in Sweden, it violates the general rule that easterly components prevail in the morning and westerly in the afternoon. Like the sea in these places, the desert stretches to the east of Yarkand, and there is every reason to suppose that something analogous to a sea-coast system of local convection currents exists which overrides the normal right-handed rotation of the diurnal breeze.

(To be continued.)

#### UNIVERSITY AND EDUCATIONAL INTELLIGENCE

THE Gilchrist Engineering Entrance Scholarship at University College, London, will be open to competition at the end of September. The conditions of examination are this year somewhat altered in a direction which places the scholarship better within the reach of those for whose benefit it was founded. The detailed regulations can be obtained on application to the secretary of University College; the following is a summary of them:—Candidates must be under nineteen years of age, and must send in notice to compete by September 23. The subjects of examination are (1) elementary mathematics, and (2) any two or more of the following five subjects: mechanics, mechanical drawing, essay on one of three given subjects connected with mechanics or engineering, French or German, the use of tools, either carpenters' tools, or the lathe (wood or metal), or the file. The Scholarship is of the value of 35/- per annum, and is tenable for two years. There is also at University College a Senior Engineering Scholarship, awarded at the close of the session, of the value of 80/. The regulations affecting this scholarship, as well as those of the Andrews Entrance Prizes, &c., can be obtained on application to the Secretary.

UNIVERSITY COLLEGE, Dundee, has already issued its first Calendar, necessarily a thin one, but bound to increase in size. So far as the science classes are concerned, and these are the prominent features in the College, the arrangements are fairly

<sup>1</sup> Richthofen, in his work on China, similarly attributes the enormously thick formations of *loess* in the northern part of that country, to the action of the winds. It seems reasonable, however, to imagine that, like the analogous European deposits, it might have been originally deposited as Pleistocene glacial unstratified mud from the neighbouring Tien-Shan and Kuen-Lun ranges, and that it has since been redistributed and perhaps in part augmented, by aeolian action. The fact that it occurs in North China, and not South China, and that traces of the Glacial period extend as far south as the Himalaya, favours this supposition.

complete, and a good staff of professors has been obtained. That literature will not be neglected is evident from the fact that the Principal of the College, Prof. Peterson, has for his subjects Latin and Greek. We have also received the Calendar of the Mason Science College, Birmingham, a thick volume which shows the institution to be in excellent working order. The Calendar of University College, Liverpool, is much more modest, though its staff of professors and lecturers is pretty comprehensive.

### SCIENTIFIC SERIALS

*Atti of the R. Accademia dei Lincei*, May 6.—Report on Veri and Parona's "Geological Studies of the Fossil Shells of Terni and Rieti," by MM. Taramelli and Calellini.—Report on Dr. Lucchetti's "Crystallographic Notes," by MM. Koerner and Spezia.—A memoir (in French) on the invariants and covariants of a function transformed by a quadratic substitution, by W. Spottiswoode.—On the nature of the expansions of gas produced by the electric spark, by Sig. Villari.—Distribution of matter acting on the surface of an ellipsoid in order to procure in the interior of such a body a given action constant in force and direction, by Sig. Glaser.—On the relations existing between the refrangent power and chemical constitution of organic combinations, by MM. Bernheimer and Nasini.—On a hypergeometrical differential equation, by Sig. Besso.—Some theorems relative to the binary forms of any power, and their application to the study of the multiple roots of equations of the sixth degree, by Sig. Maisano.—On some derivatives of berberine, by M. Bernheimer.—On the distortion of perspective observed in the telescope, by Sig. Govi.—Meteorological observations at the Royal Observatory of the Campidoglio during the month of April.

May 20.—Note on Ugo Balzani's "Early Chroniclers of Europe," by S. Tommasini.—On the commentators on Martianus Capella, by Sig. Narducci.—On the theoretic value of the coefficient of tension, of the atomic specific heat of aëroform bodies, and of the dynamic equivalent of calorific, by Sig. Violi.—Account of the recent archaeological discoveries in Ventimiglia, Gussola, Casalmaggiore, Norcia, Tarentum, and other parts of Italy, by Sig. Fiorelli.

### SOCIETIES AND ACADEMIES

#### PARIS

**Academy of Sciences**, August 13.—M. Blanchard, president, in the chair.—On Kekulé's  $\beta$ -butylglycol  $\text{CH}_3-\text{CH}(\text{OH})-\text{CH}_2-\text{CH}_2\cdot \text{OH}$ , obtained as an accessory product of the hydrogenation of aldehyde, by M. Ad. Wurtz.—On the laws of reflection as applied to the displacements of elastic bodies of definite form acted on by external forces, by M. X. Kretz.—A comparison of the hypotheses of magnetic fluids and molecular currents, by M. P. Le Cordier.—Experimental researches on the action of a liquid introduced by a special process into the tissues of the vine for the purpose of destroying phylloxera (continued), by M. P. Lafitte.—Note on a composition employed by Mr. Hatch of San José, California, for the destruction of phylloxera, by M. J. Caire. The constituents of this compound are equal weights of sulphuret of carbon, potash, oxide of iron, and sulphur, mixed with eight times the same amount of mercury.—On copper as a preventative and curative of cholera, by M. V. Burg. After a study of thirty years the author concludes that copper absorbed in various ways into the system acts as an almost perfect prophylactic, the exceptions not being more numerous than in the case of vaccination as a preventative of small-pox. Amongst other precautions he recommends the external application of copper under the metallic form of armatures, plates, or even ordinary coins; the burning of dichloride of copper in alcoholic lamps; wine mixed with the natural mineral water of Saint-Christau; and the use of vegetables rendered green by sulphate of copper. The question of the treatment of cholera patients by copper is reserved for a future communication.—In connection with this subject, M. P. Davin recalls a memoir addressed by him to the Academy in July, 1873, on the bronze dust used in gilding as a specific against cholera.—Observations relative to a previous communication of M. A. Gaillot on the changes produced in the length of the Julian year, by Mr. E. J. Stone of the Radcliffe Observatory, Oxford.—On the determination of the right ascensions of circumpolar stars, by MM. Ch. André and Gounessiat.—On the critical point of oxygen, by

M. E. Sarrau.—On the distribution of the caloric liberated or absorbed by oxygen and carbon respectively when combining to form oxide of carbon and carbonic acid, by M. A. Boillot.—On the composition of the asphalt or bitumen of the Dead Sea, by M. B. Delachanal. The presence of sulphur in considerable quantities is determined, implying a mineral origin, and distinguishing this bitumen from all others, which are of organic origin.—On the danger of contagion from the use of cracked stoneware in infectious diseases, by M. E. Peyrusson. It is shown that the germs of cholera, typhoid fever, and similar disorders may be preserved even in the slight fissures on the glazed surface to which all crockery and faience are liable.—Memoir on wheaten flours (part ii.), by M. Ballard. The author shows that variable quantities of gluten may be obtained from the same flour, according to the different treatments to which it is subjected.—On the origin of individuality in the higher animals, by M. de Lacaze-Duthiers.—On the evaporation of marine and fresh water in the Rhone delta and at Constantine in Algeria, by M. Dieulafoy.—On the means employed to determine by continuous registration the slight movements in the crust of the earth, by M. B. de Chancourtois.—On the cultivation of the date-palm in soils charged with marine salt, by M. A. Richard. The present flourishing condition of the palm-groves at Elche and Alicante, on the south-east coast of Spain, shows that this plant thrives well in land saturated with salt water.

#### VIENNA

**Imperial Academy of Sciences**, June 7.—C. von Ettingshausen, on the Tertiary flora of Borneo.—Z. von Roboz, on *Calciduba polymorpha*.—G. Tschermak, contribution to classification of meteorites.—H. von Foullon, on the mineralogical and chemical composition of the meteorite which fell at Alfiarello on February 16, 1883.—J. Kachler and F. V. Spitzer, on the action of sodium on camphor.—F. W. Dafert, on periodides.—J. Schlesinger, on the causes of inertia and motion of masses.

### CONTENTS

#### PAGE

Decentralisation in Science . . . . .	385
Essays in Philosophical Criticism. By George J. Romanes, F.R.S. . . . .	386
Letters to the Editor :—	
Simultaneous Affections of the Barometer.—Prof. Balfour Stewart, F.R.S. . . . .	387
Dreaming.—A. B. G. . . . .	388
Thunderstorms and Aurora.—E. R. Chadbourne . . . . .	388
“Elevation and Subsidence.”—F. Young . . . . .	388
Insects and Flowers.—Alfred O. Walker . . . . .	388
A Meteor.—A. Trevor Crispin; Albert J. Mott . . . . .	389
Animal Intelligence.—F. Welch; Alfred O. Walker . . . . .	389
“Birds and Cholera.”—E. S. T. . . . .	389
Liquid Films and Molecular Magnitudes. By Profs. A. W. Reinold and A. W. Rucker (With Diagrams) . . . . .	389
Japanese Learned Societies . . . . .	393
Researches on the Deep-Sea Fauna from a Zootaxonomical Point of View. By Dr. Anton Stuxberg . . . . .	394
Dr. Tromholz's Auroral Observatory at Kautokeino (With Illustration) . . . . .	397
Aldabra Island Tortoises. By W. Littleton . . . . .	398
The Meteorology of the Arctic and Subarctic Portions of the Atlantic Ocean. By Alexander Buchan . . . . .	398
Vienna International Electrical Exhibition . . . . .	399
Notes . . . . .	400
Our Astronomical Column :—	
Variable Stars . . . . .	403
The Great Red Spot on Jupiter's Disk . . . . .	403
The Minor Planet, No. 234 . . . . .	403
Geographical Notes . . . . .	403
The Edison-Hopkinson Dynamo-Electric Machine . . . . .	405
Indian Meteorology, I. . . . .	405
University and Educational Intelligence . . . . .	407
Scientific Serials . . . . .	408
Societies and Academies . . . . .	408

ERRATUM.—Vol. xxviii. p. 343, col. 2, line 36 from bottom, for *Linn* read *Lins*.